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Proceedings of the Autumn Finfish Stock Assessment Meeting Regional Advisory Process Maritimes Region

1-5 November 1999

Keddy's Dartmouth Inn
Dartmouth, Nova Scotia

R.G. Halliday, Chairman

Department of Fisheries and Oceans
Science Branch, Maritimes Region
Bedford Institute of Oceanography
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Nova Scotia, B2Y 4A2

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ABSTRACT

The purpose of the meeting was to provide advice on the status of haddock and cod in Div. 4X/5Y, pollock in Div. 4VWX and Subarea 5, silver hake in Div. 4VWX, and porbeagle shark in Subareas 3-6, and on dressed to round conversion factors for Atlantic halibut. Stock Status Reports were approved for each of the stocks and a Fisheries Status Report was agreed upon for halibut conversion factors. Ways of applying the Precautionary Approach to groundfish stock assessments were considered. In this context, decision-making was broadened, as a pilot experiment, by increasing the number of stock and fishery attributes considered. In preparation for discussion of stock assessment analyses, oceanographic conditions in 1999, and long-term changes in the Scotian Shelf ecosystem, were reviewed. These Proceedings record the main points raised during meeting discussions and provide recommendations for future work.

RÉSUMÉ

La réunion avait pour but de formuler des conseils sur l'état des stocks d'aiglefin et de morue des divisions 4X/5Y, de goberge des divisions 4VWX et de la sous-zone 5, de merlu argenté des divisions 4VWX et de requin-taupe commun des sous-zones 3-6, ainsi que sur les facteurs de conversion du flétan habillé en flétan entier. On a approuvé des Rapports sur l'état des stocks pour chacun de ces stocks ainsi qu'un Rapport sur l'état des pêches en ce qui concerne les facteurs de conversion du flétan. On a également envisagé des moyens d'appliquer l'approche de prudence aux évaluations de stocks de poisson de fond. Dans ce contexte, on a élargi le processus décisionnel, à titre d'expérience-pilote, en augmentant le nombre de stocks et d'attributs de pêche examinés. En préparation pour les discussions sur les analyses d'évaluation de stocks, on a examiné les conditions océanographiques en 1999 et les changements à long terme dans l'écosystème du plateau néo-écossais. Le présent compte rendu fait état des principaux sujets discutés durant la réunion et présente des recommandations de travaux de recherche futurs.

INTRODUCTION

The chairman opened the meeting at 1330 hr on 1st November 1999 in the Regency Room, Keddy's Dartmouth Inn, 9 Braemar Drive, Dartmouth. He initiated a round of introductions and began circulation of an attendance list (summarized for the meeting as a whole in Appendix 1; invitation letter to members of the fishing industry is at Appendix 2).

Attention was drawn to the most recent version of the agenda and schedule (Appendix 3). The initially proposed meeting duration of five days was reduced to four and a half as a number of participants were not able to attend a Monday morning session on 1st November. It was emphasized that the meeting was scheduled to run until 1700 hr on Friday 5th November and that the full time would be needed. Participants were urged to plan accordingly. It was not intended that the committee would meet during the evening.

The first afternoon was devoted to general presentations that would set the scene for the stock assessment discussions of the following days. Stock status of four Scotian Shelf groundfish stocks and porbeagle shark in NAFO Subareas 3-6 had to be assessed, and advice given on processed to round conversion factors for Atlantic halibut. The anticipated procedure for stock assessments was to hear an overview presentation by the lead analyst for a particular stock followed immediately by a review of the Working Paper (WP) that provided the data and analysis on which the presentation was based. This was to be followed immediately by a first review of the draft Stock Status Report (SSR) that summarized the results of the analysis and the advice that the committee would provide on stock status. This linking of WPs and SSRs was an attempt to nail down agreement on the major points of an assessment at an early stage. Too often in past meetings, review of SSRs separately from WPs had resulted in reopening of issues already agreed upon, because meeting participants had changed or previous agreements were forgotten with the passage of time. Copies of WPs and SSRs would be made available to participants for their review prior to their being discussed.

The chairman, prior to the meeting, had appointed external reviewers for each of the stock assessments. These people had been asked to take a particular interest in the analysis of their assigned stock, and analysts had been requested to put the data and analysis in the hands of these reviewers before the meeting to the extent possible. The definition of 'external' used was that the reviewer and analyst were from different laboratories.

Rapporteurs for each agenda topic had also been assigned. Those reporting on stock assessments were requested to have their accounts of the discussions about stock status available the morning following the discussions for committee approval. Time was provided on the schedule for Proceedings review. This was viewed as another way to keep track of decisions as the meeting progressed so that arguments were not revisited.

The availability of WPs containing the 1999 results of the DFO research vessel (RV) surveys on the Scotian Shelf in summer and in the Southern Gulf of St. Lawrence in

autumn was brought to the attention of participants. Copies of Stock Status Report A3-35 (1999) which contained updates on the status of a number of Scotian Shelf groundfish stocks would also be made available. These documents would not be discussed by this meeting but questions or comments could be directed to appropriate DFO staff on an individual basis. (A list of all WPs made available to participants during the meeting is at Appendix 4.)

The chairman then asked for, and received, approval of the agenda and schedule without change.

At the beginning of the meeting on Tuesday 2nd November the chairman made a number of additional remarks prior to initiating discussion of stock assessments. Attendees were reminded that a condition of participation in the meeting was agreement that the proceedings would be kept confidential until the results were officially released. This would occur in two to three weeks, once SSRs were edited and translated and the Minister briefed. (This statement was reiterated on Thursday 4th November, when many new participants were present for discussion of the status of porbeagle shark.)

It was explained that the products of the week's work were SSRs for each of the stocks on the agenda, and a Fisheries Status Report (FSR) on halibut conversion factors. (Fisheries Status Reports are similar to Stock Status Reports but they concern management issues rather than the status of stocks. They are directed to Regional DFO managers, not the FRCC.) What were tabled were only first drafts of these Status Reports – everything in them could be changed at this point. Participants had to agree on the final content of these reports before the meeting ended. There would be no substantive changes made to these reports after this meeting. An Editorial Board was scheduled to meet the following week, but that board would be concerned with quality of presentation only. The chairman would be the one who signed off the reports, continuing the regionalization of approval procedure instituted last year.

The meeting was encouraged to strive for a common view on Status Report contents, but if there were views that could not be reconciled, the reports should reflect these. The reports would be approved by consensus. The chairman's definition was that consensus was reached when no-one felt that they must object to the wording of the report – that they could accept it, even if they did not necessarily like it very much.

The chairman also pointed out that, except for porbeagle shark, these stock assessments had a long history. Throughout that history, a central feature of the assessments had been a Sequential Population Analysis (SPA). This year, an attempt would be made to broaden the base of these assessments using multiple indicators of stock and fishery status (as discussed the previous day). It was hoped that the focus of discussion would be on these other indicators and on how useful they were. In the past the focus of attention had been on the SPAs. Indeed, typically, people had been sent away to work through the night in the hope that, if this or that was changed in the analysis, the truth about stock status would be clearly revealed. But, of course, this had not happened in the 20-yr history of assessing these stocks, and it was not going to happen this year either. It was

the chairman's intention to resist proposals of this sort for SPA reruns. Of course SPAs that were presented had to be examined to see if there were errors in the data or in the application of methods. These would certainly need to be corrected. Also, suggestions for improvements in methods for future years would be welcomed.

No comments were made or questions asked in relation to these remarks.

A list of the recommendations made during the meeting for improvements in stock assessments in future are summarized in Appendix 5.

ENVIRONMENTAL OVERVIEW

Working Paper:

Drinkwater, K.F., R.G. Pettipas, and L.M. Petrie. 1999. Recent temperature changes on the Scotian Shelf and in the eastern Gulf of Maine. RAP WP 99/63.

Rapporteur: Ken Drinkwater

Ken Drinkwater reported that the cold Labrador Slope Water that penetrated south to the Middle Atlantic Bight in 1998 retracted north to the Laurentian Channel in 1999 and was replaced by Warm Slope Water. As a result, the cold near-bottom temperatures observed in the lower layers of the deep basins of the Scotian Shelf and Gulf of Maine and throughout 4X had warmed by July 1999 to near or above normal conditions. The very warm waters on the bottom of Browns Bank were due to an intrusion of Warm Slope Water in the spring of 1999. The waters in the lower layers of the northeastern Scotian Shelf warmed above normal for the first time since the mid-1980s. Surface temperatures throughout most of the Scotian Shelf and eastern Gulf of Maine in 1999 were much warmer than average. This was due to atmospheric heat exchange and very warm air masses over the region.

Industry participants noted differences in fish distributions on fishing grounds off southwestern Nova Scotia between 1998 and 1999 that they attributed to changes in water temperatures. Dogfish were not a problem in 1998 but hake and haddock were scarce. In 1999, dogfish were back and hake and haddock were more available. An unusual amount of Atlantic halibut was observed associated with the warm water.

LONG-TERM CHANGES IN THE SCOTIAN SHELF LARGE MARINE ECOSYSTEM

Presenter: Kees Zwanenburg

(This presentation was derived from a more comprehensive overview of the Scotian Shelf ecosystem to be published as: Zwanenburg, K.C.T., D. Bowen, A. Bundy, K. Drinkwater,

K. Frank, R.N. O'Boyle, D. Sameoto, and M. Sinclair. *In Press*. Decadal changes in the Scotian Shelf large marine ecosystem, **In:** *Changing States of Large Marine Ecosystems of the North Atlantic, and Global Environmental Trends*. Blackwell Scientific.)

This presentation reviewed the history of exploitation of the Scotian Shelf large marine ecosystem. The first records of exploitation indicate about 10,000 tons of fish were exported from adjacent communities in the early 1700s. Between then and 1973 removals increased to 500,000 metric tons. By 1993 many of the fisheries, especially on the eastern shelf, had closed. The review examined changes in environmental conditions as well as changes in the fish communities. These latter estimates were derived from the July trawl survey data collected since 1970.

Density of commercially-exploited fish decreased significantly from the mid 1980s to the late 1990s. Indices of trawlable biomass for both the eastern and western Scotian Shelf show long-term declines. Trawlable biomass on the western Scotian Shelf remains relatively high due to significant increases in spiny dogfish biomass. Total finfish biomass, that is trawlable biomass corrected by catchability coefficients, shows increases since the mid 1980s. Coupled with the decrease in demersal fish biomass this indicated change in the demersal to pelagic biomass ratio, with a relative increase in demersal biomass in recent years. The catchability coefficients used to correct trawlable biomass were derived from previous work by Edwards. These earlier estimates were extended to other species by using similarities in morphology and known behavioral characteristics. Improved estimates of catchability through the use of SPA-based estimates and comparative fishing experiments are essential to refining these estimates of catchability coefficients.

The average size of all demersal species on both portions of the Scotian Shelf showed significant declines between 1970 and the mid 1990s. The average weight of a fish on the western Scotian Shelf decreased from 1.9 kg to about 0.74 kg. The average weight of demersal fish on the eastern shelf decreased from about 1.5 kg to less 0.47 kg. These decreases were evident in commercially-exploited species as well as non-commercial species. This indicates that commercial fisheries have impacts on non-commercial species through by-catch or other processes, or that both groups are subject to the influence of changing environmental conditions. We noted that the average size of a demersal fish is consistently larger on the western Scotian Shelf relative to the eastern shelf. We also noted that the rate of decline in commercial species is somewhat sharper on the eastern shelf than the western shelf. This may be explained by the different temperature regimes for the two portions of the shelf. The western shelf is consistently warmer than the eastern shelf. These warmer bottom temperatures result in higher growth rates.

We presently have little or no knowledge of the size structure of these communities at the time exploitation was initiated in the 1700s. We only have observations for the past 30 or so years. It would be highly informative to examine historical sources of information on community size structure. At present we have no historical context in which to judge these decreases in size.

Overall size composition also differs between the eastern and western Scotian Shelf. The eastern Scotian Shelf contains larger numbers of smaller fish whereas the western Scotian Shelf contains larger numbers of larger fish. The overall size structure of these two ecosystems has changed between 1970 and the present. An examination of the descending limb of the integrated community size frequency (ICSF) indicates that this has become steeper for both systems. The descending limb of the community size frequency is an integrated measure of mortality and growth for the demersal fish community as a whole. An increase in steepness could be the result of increased mortality as would be caused by increases in fishing, or the result of decreases in overall growth rate, as would be caused by significant cooling of bottom temperatures.

These changes in average size and community size frequency may have significant implications for the structure and dynamics of these communities. The decreases in size change the predator field to which the species is exposed and change the prey field to which it has access. Changes in size also have significant impacts on the reproductive capacity of many of the species. Some, like cod, have developed evolutionary strategies which depend on the presence of large highly fecund females to bridge long gaps in poor recruitment years. The absence of these females jeopardizes such a strategy.

These changes in community size frequency are clearly associated with increases in fishing effort on both the eastern and western Scotian Shelf. The slope of the ICSF increased concurrently with the build-up of fishing effort that occurred following Canada's establishment of the 200-mile exclusive economic zone in 1977. It is somewhat risky to draw conclusions based on only 30 years of survey data from the system, which has been exploited for nearly 300 years. However, these are the data that are available. It was noted that a reversal of this trend in decreasing size is indicated after effort was reduced in the early 1990s.

Changes in environmental conditions, especially the cooling of the eastern shelf, were concurrent with the observed changes in demersal fish communities. In addition to the size changes noted above, capelin, which was relatively rare prior to the 1980s, became increasingly abundant during this cooling period. These observations also apply to snow crab and northern shrimp. These species are normally more abundant in the cooler Gulf of St. Lawrence or the Grand Banks and Labrador Shelf to the north. Although it is likely that the colder environmental conditions allowed the increased abundance of the species to occur, the absence of cod, a significant predator on all three species, will also have contributed. For example, the density of cod on the eastern Scotian Shelf is inversely related to the density of sandlance. During periods of low cod abundance as were observed in the early 1970s and mid to late 1990s, sandlance were relatively abundant. During periods of high cod density from the late 1970s through to the mid 1980s, sandlance were virtually absent from our surveys. These observations are consistent with a predator-prey relationship between these two species. While cod are abundant sandlance are not because they are being grazed down. Our knowledge of the predator-prey relationships between many of the species is rudimentary at best. In order to understand the structural changes that may occur through the effects of either fishing

or environmental conditions, an improved understanding of these interrelationships is essential.

We conclude that both fishing and changes in environmental conditions influenced these fish communities. Increases in fishing effort, which occurred from 1977 to 1993, likely reduced the abundance of larger species and specimens in both portions of the shelf. On the eastern shelf, the cooling period which occurred after the mid-1980s exacerbated this effect, as evidenced by the sharper decline in community size structure. That no such cooling period was evident for the western shelf, yet average size decreased there as well, is evidence for the impact of fishing on this community. Although we can speculate about the impacts of these observed changes, our understanding of the structure and dynamics of these communities is still too rudimentary to allow us to predict future trajectories.

PRECAUTIONARY APPROACH

Working Papers:

Mohn, R., P. Fanning, and many others. 1999. Categories of fishery status indicators to assist in resource assessment: an illustration and discussion. RAP WP 99/62.

Zwanenburg, K., and G.A.P. Black. 1999. Changes in density and distribution of commercial groundfish stocks on the Scotian Shelf. RAP WP 99/65.

Gavaris, S. 1999. An approach for considering diverse system attributes in fisheries management planning. RAP WP 99/64.

Rapporteur: Dan Lane

Presentations

The chairman introduced the topic of applying the precautionary approach to stock assessments. He noted the efforts by the FAO in the 1995 Code of Conduct and the UN Agreement on straddling and highly migratory fish stocks (the latter being the first legal document to incorporate the Precautionary Approach). The chairman also cautioned that the Precautionary Approach is not an easy concept to define. It is a philosophy under development that applies to all aspects of the fishery management system.

The chairman referred to the international initiatives on the Precautionary Approach by ICES and the NAFO Scientific Council. In Canada, a national High Priority Science program, as well as the Maritimes RAP Fisheries Management Studies Working Group and the FRCC are currently developing positions with regard to the Precautionary Approach.

It was noted that the international work to date has focused on the specification of target and limit reference points and harvest control rules. The focus of the RAP WG (as well as the FRCC) is more on examining multiple indicators. The presentations during this introductory session were meant to orient the meeting to the new approaches incorporated in the stock assessments to be reviewed later. Inclusion of additional fishery and resource status indicators was a pilot experiment for adoption of the "Traffic Light" approach to decision-making.

While not required by the Precautionary Approach as defined in the UN Agreement, the chairman noted a number of reasons for the use of multiple indicators. These include the need for a broader view that included all elements of the fisheries system, the practical need for indicators of status for "data-poor" stocks, and limitations on the accuracy of estimates of current fishing mortality and stock biomass that could be achieved using analytical models.

It was brought to the chairman's attention that there was also an Ottawa WG chaired by Jacques Robichaud charged with developing the Canadian position to the Precautionary Approach within the NAFO context. The Proceedings of the Fifth National NMFS Assessment Workshop (Restrepo, ed.: NOAA Tech. Memo. – F/SPO – 40, July 1999) is also of interest with regard to the Precautionary Approach.

Categories of fishery status indicators to assist in resource assessment: an illustration for discussion by Mohn, Fanning, and others presented a practical approach to integrating analytical, biological and other fishery-related information by simplifying the information into discrete states. Time graphs were used to delineate the classification schemes for the various indicators. Examples were taken from data for the 4VsW cod stock and for the 4X haddock stock. Indices were selected from SPA output and RV survey results (biomass, recruitment and mortality), stock distribution proxy measures (from RV surveys), growth rate (for selected ages) and condition factor. For each of the indices, metrics were specified. As well, quantitative target reference points, and associated precautionary limits were determined for each metric. These values took into account the historical range of values for the indicators. The targets and limits defined the discrete states for each of the indicators, i.e., indicator values that surpassed their respective targets were considered 'above average' or 'green'; values between target and limit, were denoted as 'below average' or 'yellow'; below limit, values were in the 'danger' zone or 'red'. A summary (Traffic Light) table with illustrative weightings for each indicator and classification level was used to calculate an overall (linearly weighted) view of the status of the stock.

Main points of discussion:

- The proposed graphical classification approach was accepted as a simple, logical methodology for taking into account multiple stock indicators.
- It was pointed out that indicators for several attributes rely on the same source of base data, e.g. RV surveys are often used as SPA input. The question was raised whether or not these indicators could be collapsed into a more parsimonious set of indicators.

- The absence of environmental/ecosystem factors was pointed out as a shortcoming of the indicators being evaluated. The question was raised as to how these factors might also be included in the set of indicators.

Changes in Density and Distribution of Commercial Groundfish Stocks on the Scotian Shelf by Zwanenburg and Black presented a series of graphics that described changes in stock density and stock distribution for a selected set of commercially exploited groundfish stocks on the Scotian Shelf using RV survey data. The measures utilized in the groundfish assessment WPs as indicators of resource concentration and geographical range were the proportion of area that included 75% of biomass, and the proportion of sets with non-zero catches, respectively.

Main points of discussion:

- The question of interpretation of the numerous graphics was left as open-ended.
- It was pointed out that the data appeared to show an abrupt change from 1995 to 1996 and it was suggested that perhaps there may have been a systematic change in the research vessel survey that could explain this change. However, no change took place in surveys between these years.

An approach for considering diverse fishery system attributes in fisheries management planning by Gavaris described fisheries management planning as a decision problem requiring the specification of objectives, strategies to attain goals, and tactics. Feedback about how the tactics and strategies (identified by decision-makers) perform viz. the objectives is obtained through information about the state of the fishery system as determined from technical analyses. Analytical results can be expressed as the probability that an attribute (e.g. biomass, fishing mortality, geographic distribution, growth at age, age at maturity) will achieve a specific reference level for a given action. It was proposed that attributes whose forecast state is directly linked to the choice of action be referred to as 'response attributes' and those largely independent of actions be denoted as 'productivity attributes'. Whereas response attributes were taken into account through annual TAC (or other regulatory) adjustments, productivity attributes could perhaps best be taken into account by adjustments to reference points themselves or to the acceptable risk probability. The author suggested that a discrete ranking scheme could be used to modify reference points using productivity attributes, e.g. a 5-point scale with 10% cell width, and proposed further investigation to explore relationships between stock productivity and the selected productivity attributes.

Main points of the discussion:

- The paper represents a general framework for applying a Precautionary Approach.
- This decision-making framework is an alternative to that in Working Paper 99/62.
- The question remains as to how to reconcile different approaches among presentations for all research documents and SSRs.

The Chairman noted the preliminary but important nature of the work documented in these three WPs. Now that the topic had been introduced, the various approaches would be recognizable in the presentations to come in the various groundfish stock assessments. The advisory process has been criticized for not utilizing fully the biological and fishery information that has been available when providing scientific advice and the multi-indicator approach provides a way to rectify this.

Applications in the Groundfish Stock Assessments

There was much discussion regarding the appropriate manner of inclusion of the Precautionary Approach material in current year SSRs and, indeed, on whether it should be included at all. There was concern that introduction in SSRs of many new elements associated with the Precautionary Approach could cause confusion for clients and that the advice might not be well understood. A substantial educational effort would need to be made concerning the Precautionary Approach and there was insufficient time to do that. In particular, the introduction of weighting systems and point scoring was particularly contentious. It was emphasised that the introduction of new indicators was a pilot experiment and the attention at this stage should be directed toward evaluating the utility of the indicators themselves.

After review of several of the assessment WPs it was decided that a summary table would be included at the beginning of each SSR, each entry in which would be supported by appropriate text and figures in the body of the SSR. No scores (or 'lights') would be provided or indicator weightings applied but qualitative descriptions of recent trends and current status of indices would be given. A standard introduction to the tables was produced that stated that these "should be an aid for decision makers". This was viewed as an initial step towards a more comprehensive application of the Stop Light method.

It was pointed out that the indicators included in the assessment WPs were almost exclusively related to attributes of the resource itself and not of the fishery or the environment. Industry participants received favourably an indictor in the pollock WP based on Fishermen's Reports of recent fishery conditions. However, there were no indicators for management measures, e.g. discards, incidences of reported dumping. It was noted that WP 99/62 contained a more extensive list of indicators than it had proved possible to apply in this round of assessments, and it was agreed that a broader suite of indicators should be developed for future assessments.

At the end of the meeting it was agreed that the pilot introduction of multiple indicators had been fruitful and had aided in the formulation of advice. The introduction of the tabular summary of the results was viewed as a good first step in introducing this new approach to clients. However, it was thought to be rather difficult to obtain an integrated view of overall stock status from it and that a graphical approach should be considered in future.

HADDOCK ON THE SOUTHERN SCOTIAN SHELF AND BAY OF FUNDY (DIV. 4X/5Y)

Working Paper:

Hurley, P.C.F., G.A.P. Black, P.A. Comeau, and R.K. Mohn. 1999. Assessment of 4X haddock in 1998 and the first half of 1999. RAP WP 99/54.

External Reviewer: Joe Hunt

Rapporteur: Joe Hunt

The Fishery

- Inclusion of catches from the 4Xs and 5Y, as initiated last year, was still considered appropriate. However, there was a need to obtain samples of commercial landings from these areas for use in generating the catch at age.
- Extension of the interim 1998 quota year to end March 31st 1999 reduced targeting for haddock.
- The slow start to the 1999 fixed gear fishery was attributed to low availability in inshore areas, high abundance of dogfish and unusual distribution of other species that could have been in response to warmer water conditions.
- Discards were not considered to be a substantial factor in this fishery. However, if present they could contribute to the retrospective pattern.
- Seasonal length/weight parameters were last reported in 1983 and these have been used since that time. Recalculation of the relationship(s) should be investigated, particularly in light of observed changes in size at age and condition factor.
- The substantial difference between the predicted catch at age for 1998 and 1999 and the observed catch at age was attributed to variation in the partial recruitment pattern.
- The apparent decrease, based on length frequencies, in numbers of large haddock in recent years could be due to a combination of exploitation and decreased growth rates.

Resource Status

- The appropriateness of comparing abundance indices from the RV survey with those from the ITQ survey was questioned based on sampling design, gear differences and the difference in the number and distribution of sets in the ITQ survey between 1995 and 1996-99.
- Use of ages 2-7, adjusted by partial recruitment, to set the F on the oldest age group (age 10) was explained and accepted.
- Revised estimates of PR derived from ADAPT iterations were discussed in the context of smaller size at age. Note was made that at age 6 the PR was about 0.8 while mean length was just over the minimum market size (43cm) with an implied potential for discarding.

- The overall shift in PR to older ages was considered consistent with changes in mesh size and fishing practices implemented since the last review of PR.
- Application of a Gompertz model to adjust year class abundance from the ADAPT estimate to account for retrospectivity and other potential bias was accepted for the 1997 year class but was considered no longer appropriate for the 1993 and 1994 year classes.
- RV weights at age for 1999 were considered appropriate for estimating population biomass but 1998 commercial fishery weights were used for estimating yield since 1999 values were half year and derived from catches in 4Xmno.

Outlook

- Use of ages 4+ as a proxy for SSB, rather than the maturity ogive used in 1998, was accepted given that the ogive was out of date and probably had changed in response to the decrease in size at age.
- Considerable discussion of the definition and qualification of Precautionary Approach indices did not result in consensus. Issues included indicators to be used, standardization of the reference target and limit, qualification of present status and appropriate weighting.

Stock Status Report

- Add statement to the Fishery section on low availability in the inshore area in 1999, abundance of dogfish, and potential impact of warmer water on species distribution as reasons for the slow start in 1999.
- Note that 1995 observation from the ITQ survey had fewer sets and was more concentrated in the expected haddock stock area.
- Qualify how the inshore abundance, size and age measured by the ITQ survey differed from those in the RV survey area.
- Explain why 1993 and 1994 year classes were not adjusted for the retrospective pattern in this year's assessment.
- A proposal was rejected to include an explanation of why the 30,000t estimate of SSB for 1998 made last year is now 40,000t.
- Delete 1999 observation from the exploitation figure (half year value).
- Report the estimated value (41 million) and adjusted value (24 million) for the 1997 year class at age 2 in 1999.
- Describe the difference in SSB estimates had the same adjustments as made to the 1997 year class been made to other year classes also, as in 1998.
- Delete reference to SSB in 2002, as it is partially determined from GM recruitment.
- Include risk plots for SSB and fishing mortality.

COD ON THE SOUTHERN SCOTIAN SHELF AND BAY OF FUNDY (DIV. 4X/5Y)

Working Paper:

Clark, D.S., and S.D. Paul. 1999. Assessment of cod in Division 4X in 1999. RAP WP 99/55.

External Reviewer: Kees Zwanenburg

Rapporteur: Kees Zwanenburg

Last year there were two models in the SSR. One was tuned on RV + ITQ survey data and that one gave a 1998 age 4+ biomass of 36,000 t. The other was tuned on RV data for 1983-1992 and 1993 onwards, to account for changes in q between periods, and this resulted in a 1998 age 4+ biomass of 26,000 t.

This year:

- RV Survey population estimates were down sharply from 1998 (Bay of Fundy lowest ever);
- ITQ Survey population estimates have been decreasing every year since 1995;
- Growth rate in the Bay of Fundy higher than on the shelf;
- Total fishing effort in 4X is declining and is shifting geographic locations (gillnets);
- Total small dragger effort in 4X is relatively stable since 1995;
- The amount of effort directed at cod is declining;
- The number of vessels reporting cod landings has been declining since 1996;
- Older ages have been absent in catches in recent years;
- No trends are observed in weight at age;
- Large numbers of young fish (ages 0-1) were caught in the 1999 ITQ survey.

Stock Status

Sampling was inadequate in 1999 because not all areas where fishing occurs are sampled in proportion to landings. The 4X 'stock' is in fact made up of many small stocks.

The predicted and observed removals at age do not match well. This may result from a mismatch between catch areas and sampled areas, but the presenter considered this unlikely. Gear-specific age length keys may help to alleviate predicted vs. observed differences in catch at age. It was also suggested that the by-catch nature of the fishery may result in differences between predicted and observed age structure of removals. The presenter considers that the predicted and observed catch at age difference is due to a retrospective problem in model output. It was recommended that the use of quarterly age-length keys within gear and area, applying keys from adjacent years when data are missing, should be investigated for the next assessment. This should be feasible, as there are no trends in weight at age or condition factor over years.

The question of older ages disappearing from catch at age due to ageing errors was raised. However, the same age reader has aged 4X cod for the past 10 years and precision of readings is high. The presenter considers that high Fs in the early 1990s resulted in removal of older fish and that the reduction in catches of older fish is real. An industry participant stated that 30% of fish landed at his plant is larger than 75 cm in 1999. However, this was not put into an historical context. Loss of older ages is also seen in the RV survey catch at age. It was recommended that the US survey data be analyzed to improve estimates of length and age composition and trajectory of the 4X cod population. It was also suggested that historical data on population size and age structure be included in the assessment to put the present size/age composition in context.

There was considerable discussion of whether or not the ITQ survey estimates should be accepted as indicative of abundance and used in calibration of the SPA. The ITQ survey is consistent with the RV survey in showing that the stock is presently in a depressed state. However, the ITQ survey shows some encouraging signs of 0 and 1 year old fish. (It was noted that, in future, the ITQ survey data should be presented as mean catch per area swept, making stock size estimates more directly comparable to those from RV surveys.) A view was expressed that it doesn't matter if ITQ data are included or not as inclusion should not change the results much. The presenter responded that the ITQ survey data should not be used because the time series is too short and q's for this survey, along with population estimates from this model formulation, are unstable. Including the ITQ data increases the overall inter-annual variability of the model outputs. It was countered that the general trends in the ITQ survey were similar to those from the RV survey and that, barring a more compelling argument for the exclusion of these data, they should be considered in the analysis. It was recommended that, for the next assessment, alternative approaches to incorporation of the ITQ surveys be explored that make the fullest use of the data available.

The SPA model outputs showed old fish contribution to biomass as high in most recent years, which is not consistent with observational data. Industry participants offered possible explanations of this apparent discrepancy. Large cod and dogfish both occur in deeper water and, as dogfish make cod less catchable, this may mask the presence of large cod. The issue of environmental effects on the catchability of cod was also raised. It was felt that if the industry directed at the species, rather than taking it mainly as by-catch, they could catch a lot more.

Outlook

It was generally agreed that there was no objective method of deciding the most appropriate formulation of the model (i.e. including the ITQ survey or not). It was proposed that the model including both RV and ITQ surveys be used to give some indication of where the resource is. However, advice would be phrased more generally, encompassing the output from both models, that catches at $F_{0.1}$ in 2000/01 would be in the order of 4000-6000t. No Armstrong or risk plots would be provided. This result would then be interpreted in light of the other evidence presented to help formulate advice.

POLLOCK IN DIV. 4VWX AND SUBAREA 5

Working Paper:

Neilson, J.D., P. Perley, and C. Nelson. 1999. The 1999 assessment of pollock (*Pollachius virens*) in NAFO divisions 4VWX and subdivision 5Zc. RAP WP 99/56.

External Reviewer: Doug Swain

Rapporteur: Doug Swain

The Fishery

A number of changes to the fishery in the 1990s were emphasized in addition to those described in the WP. These included by-catch restrictions (e.g. limits on white hake by-catch) which prevented or limited fishing for pollock in some areas where they were available and the exclusion of otter trawlers from some of their traditional pollock fishing grounds due to fishing by fixed gear (gill nets) in these areas. Due to these and other recent restrictions on the fishery (e.g. area restrictions), some members of the industry doubted the utility of fishery catch rates as an index of abundance, suggesting that the high catch rates seen in the early 1980s would no longer be possible.

Resource Status

The possibility of using abundance indices derived from the July RV survey in future assessments was discussed. It was recognized that the abundance signal for pollock was very variable for this survey and that the survey cannot track cohorts of pollock. However, it was suggested that some alternative to the stratified mean catch per tow (e.g. log survey catch rate or an index based on distribution) might provide useful information on abundance, particularly if used to provide an age-aggregated index. Investigation of the utility of an age-aggregated abundance index based on the RV survey data was suggested as a research recommendation, though reservations were raised regarding the adequacy of survey coverage for pollock. It was noted that deliberations within ICES had led to the conclusion that general-purpose RV bottom-trawl surveys were inadequate to provide abundance indices for pollock (saithe). The possibility of using an index from the ITQ survey was also raised. The meeting was informed that acoustic survey methods are being tested. It was recommended that, for the next assessment, the use of RV and ITQ surveys for calibration of the SPA should be re-examined.

Distribution indices from the RV survey were discussed. The conclusion that pollock have become increasingly dispersed was questioned. It was suggested that the index of distribution most relevant to possible changes in catchability to the fishery might be the area containing 75% of the biomass. Unlike the proportion of non-zero sets, this index provides a measure of the degree of concentration in distribution that is independent of the level of abundance. It was noted that there was a sharp decline in this index in recent

years and that this would be consistent with an increase in catchability to the fishery. It was also noted, however, that the area containing 75% of the log of pollock numbers showed a different trend, and that all of the indices need to be considered to obtain a complete picture of the changes in pollock distribution. Examination of age-specific indices was suggested to resolve some of the conflicting trends in distributional indices.

The apparent absence of fish over 40 cm in the ITQ survey in 1999 was discussed. It was noted that this might be an artifact of expressing the length distribution in percent frequency rather than in numbers. The large decline in 1999 in the percent of fish over 40 cm may reflect the large increase in the catch of small pollock in the 1999 survey rather than a decline in the number of large fish. A figure with length frequencies expressed in numbers rather than percent frequency was requested to resolve this question. Such a figure was subsequently tabled. It showed that catches of large (>40cm) pollock were indeed low in both 1998 and 1999 compared to earlier years.

The exclusion of landings data from 4VW from the analytical assessment was questioned. It was argued that the recent concentration of the fishery in 4X5 did not provide a rationale for omitting 4VW landings from the SPA because this approach would ignore a variable proportion of the landings from the stock. It was suggested that this approach would be valid only if it were believed that there were separate 4VW and 4X5 stocks, and there was a desire to assess only the 4X5 stock because of the disappearance of the 4VW stock. It was also noted that improvements in the fit of the population model presented in the 1999 assessment result from other changes in the formulation and not from the omission of 4VW landings. Finally, there was concern that future increases in the abundance of pollock in 4VW, or in the proportion of landings from these areas, would require yet another change in the assessment framework, with a return to the inclusion of landings from the entire 4VWX5 area in the model. Some members of the industry indicated that there were more pollock in 4VW than indicated by the tabled analysis. On the other hand, it was noted that pollock stock structure in the 4VWX5 area was complex and likely does comprise a number of stock components. The difference in growth rate between the 4VW and 4X5 areas was argued as a biological basis for the exclusion of the 4VW catches. Historical tagging data might provide a resolution to the stock structure question, and it was recommended that these data be re-examined. It was agreed that the exclusion of 4VW landings from the SPA and the catch rate index would be accepted for this assessment but suggested that a return to the entire management unit should be considered for the next assessment.

Members of the FRCC expressed concern regarding the frequent changes in the approach used in this assessment in recent years. These changes made it difficult to compare the assessments of stock status from one year to the next.

Clarification on the calculation of an 'annualized' F for 1999 was requested. It was explained that this was done by prorating the landings in the first 2/3rds of 1999 to the entire year assuming the same rate of landings in the remaining third of the year.

A choice between the two options presented for the SPA model was requested by the presenter. The 'split' option allowed for a change in catchability to the fishery in 1995. The 'single' option dropped age 8 from the calibration block. It was noted that a research recommendation in 1998 had been to examine the use of a nonlinear relationship between the index and population abundance. This had been recommended because of concerns that catchability to the fishery may be density-dependent, increasing in recent years due to a concentration in pollock distribution. It was noted that the results of the 'split' option were consistent with this expectation, with greater estimated catchability for the main ages in the catch (ages 4-6) in the period since 1995. However, it was also noted that both options produced very similar views of stock status. It was agreed to present the results of only the simpler 'single' option in the SSR. The differences in the view of stock status produced by the 'split' option will be noted in the SSR as necessary.

The assumption of 4000 t of landings for the period 1 September 1999 to 1 April 2000 was agreed to be reasonable for use in the projection.

Outlook

A suggestion was made that the table of resource attributes did not seem to indicate as extreme a situation as the SPA results.

It was noted that the low estimate of catch at $F_{0.1}$ for 2000 reflected conservative assumptions regarding the partial recruitment curve (i.e., that it was dome-shaped, in order to account for the observed low proportion of old fish in the catch).

Stock Status Report

The SSR was reviewed in detail and a number of suggestions regarding wording and presentation were made. The exclusion of the 4VW data from the SPA attracted considerable discussion and concern. It was emphasized that these data were excluded in an attempt to improve the basis for advice on resource status; the exclusion did not reflect a change in perception of stock structure. It was emphasized particularly that there was no implication that the management unit should be subdivided, or that TACs should be partitioned between areas. The problem of translating advice based on analysis of data from 4X5 only to the entire management unit was debated. It was argued that advice for 4X5 should not be prorated to 4VWX5 based on the recent percent of landings in 4VW because the distribution of landings may not reflect the distribution of pollock, particularly given recent restrictions on fishing in 4VW. It was decided that the advice should be prorated to the entire management unit based on the distribution of pollock in the July RV survey.

SILVER HAKE ON THE SCOTIAN SHELF (DIV. 4VWX)

Working Paper:

Showell, M.A., and L.P. Fanning. 1999. Assessment of the Scotian Shelf silver hake population in 1998. RAP WP 99/58.

External Reviewer: Jon Brodziak

Rapporteur: Jeff McRuer

Last year (1998) was the first year the silver hake assessment was reviewed in RAP; prior to this it had been reviewed in the NAFO Scientific Council. Cautions given in the Proceedings of the 1998 RAP (CSAS Proceedings Series 99/02) were noted and attempts were made in the current assessment to explain some of the questions arising.

The Fishery

The change in the size composition of Canadian catches in 1999 was explained by a change from 60 mm diamond to 55 mm square mesh and the adoption of redesigned covers to reduce obstruction of the underlying mesh. Covers are required to strengthen the codends during haul-back. Industry agreed but thought the main effect was due to the change to 55 mm square mesh. The changes were made to protect small fish as recommended by the FRCC. Industry is still working with suppliers to find codend netting strong enough to remove the need for covers.

Cuban vessels continue to use 60 mm diamond mesh yet their catches consist of larger fish than do Canadian catches. While this might be due, at least in part, to a difference in the size distribution of silver hake in the areas fished, it more likely reflects the selection properties of the net material used by this fleet. It is presumed that the Cubans still use the polyamide, Kapron, which has a higher selection factor than the polyethylene twine used by the Canadian fleet.

The question of discards was raised but the evidence indicates that they are negligible given the 100% observer coverage of the Cuban fleet and that there is a Canadian market for small fish. It was suggested that there was some discarding in other groundfish sectors (an example was given of 2-3 tonnes discarded when using large mesh gear on some trips to the edge of Georges Bank in the early 1990s).

Industry asked if the data collected by the Fisherman Scientist Research Society was being used in this assessment and it was acknowledged that it has been used since mid 1998.

The use of commercial catch rates as indicators of stock abundance was suspect in the case of both the Canadian and Cuban fleets. The Canadian fleet consists of approximately 40 vessels that move in and out of the fishery at different times. The first

three years of the fishery were for only part of the year and different in each year, the last two have been year-round fisheries. There is a vast difference in experience, horsepower and gear used, fishing practices (some continue to fish at night despite lower catches), fouling problem of gear in 1999 and the inclusion of some exploratory fishing in winter. The Cuban fleet is now old and poorly maintained. It operates with far fewer vessels now than before with a resultant loss of scouting ability. The fleet now stays out of formerly productive fishing areas in 4X due to the potential for gear conflicts. Many things have changed in both the offshore (Cuban) and basin (Canadian) fisheries that have contributed to changes in CPUE that are not related to abundance and thus fishing success should not be used as an indication of stock status.

It was recommended that an attempt be made to develop an index of abundance from data on catch rates of the Canadian fleet by standardizing for factors such as the effect of experience, vessel horsepower and gear used, based on a cooperative effort between industry and DFO Science. It was suggested that the Silver Hake Committee might prove to be a good vehicle to use to organize this analysis.

Resource Status

Bay of Fundy – Gulf of Maine data were excluded from the analysis last year and this approach was followed again this year. It was pointed out that care must be taken when separating stock components based on a single source (ECNASAP mapping) without collaborative evidence. However, trends in RV abundance data were reviewed last year, as well as distributional data, and a separation into Scotian Shelf, and Bay of Fundy – Gulf of Maine, stocks was accepted as the correct interpretation of these data. It was pointed out, the possibility of movement between the Gulf of Maine, Bay of Fundy and Scotian Shelf, perhaps driven by an environmental feature, might be confounding the survey results. However, this was viewed as entirely speculative.

Industry questioned the ability of the RV survey to sample silver hake properly due to very few stations in the basins and nighttime sampling. It was agreed that catchability is low and there is a lot of variability in the results. It was pointed out that this is not unlike the problems in the US surveys of this species. Transformation of the data would reduce this variability, but even with the variability, patterns show through giving an indication of abundance and to trends in it. It was agreed that as poor as this might be, it is the only estimate of abundance available and would be used.

The biological indices were discussed and the trends agreed upon. Concern was expressed about the ability of the smaller fish in the spawning biomass (due to the present reduced length of 50% maturity) to contribute much to reproductive output. Spawning biomass in the past consisted of larger fish possibly with a higher potential to reproduce. No data were available on this issue.

Environmental conditions were mentioned many times for this species as silver hake are thought to prefer warmer water. No evidence was found for a temperature effect on recruitment by examining the RV age 1 abundance with the Emerald Basin temperature

anomalies but the time series was short. Examination of the RV age 1 and temperature data by lagging the data and looking at it as a threshold effect was suggested. Other environmental parameters could also be examined.

The meeting agreed with the presenter that the SPA gave a very bad retrospective pattern and could not be used to provide advice. Use of a simple surplus production model was suggested as a future alternative. Complexity could be added to the model as more is understood about stock dynamics, moving to more complicated delay-difference models and age based models over time. There was general agreement with the presentation of the data on total mortality and on recruiting year class sizes from RV data.

The SPA and CPUE stock indicators were removed from the stock status summary table to be included in the SSR because they had been determined to have too many problems to be relevant. The other indicators in the table were accepted as defined after examination of the graphs presented. Although the 'fraction non-zero' and 'area of 75% abundance' are above average in the table, the abundance is low and the situation may not be as positive as these indicators imply.

Stock Status Report

- Table of catches and TACs has an error in TAC for 1995.
- Catch graph/text is to be changed to distinguish between catches taken against national allocations and catches by foreign vessels under developmental fishery agreements. Developmental fishery catches are considered part of the Canadian catch.
- Change size composition paragraph to inshore and offshore from foreign and Canadian, again to reflect the status of developmental charter catches as Canadian.
- Mention conversion factor for vessel effect in the RV.
- Add Z-plot ages 2-4 and revise mortality text to reflect it.
- Change graph of weight at age 3 to length at age, as weight at age is a function of both length and condition.
- Use 1997-99 catches as the reference for the 2000/01 catch advice.

PORBEAGLE SHARK IN NAFO SUBAREAS 3-6

Working Paper:

Campana, S., L. Marks, W. Joyce, P. Hurley, M. Showell, and D. Kulka. 1999. An analytical assessment of the porbeagle shark (*Lamna nasus*) population in the Northwest Atlantic. RAP WP 99/57.

External Reviewer: Tom Hurlbut

Rapporteur: Tom Hurlbut

The Fishery

Industry participants described changes to the fishery that they considered to have had an important affect on catch and effort in the 1998 and 1999 fisheries. These included the early cessation of fishing in 1998 because the quota was taken and the voluntary suspension of fishing from June to September in 1999 to conserve quota for fishing activities associated with the joint industry/DFO scientific study.

It was suggested that the landings recorded as 'unspecified shark' probably represent porbeagle and that the majority of the landings attributed to Subareas 2 and 3 came from Subarea 3.

Several questions were raised concerning the boundaries of the current management unit (Subareas 3-6) and foreign landings outside it (i.e., Japanese, Spanish, Portuguese, etc.). It was suggested that there may be records of high seas landings of porbeagle shark in the East and West Atlantic in ICCAT or ICES documents.

Resource Status

During the discussion of stock structure and migration, it was suggested that gravid females may move offshore into the Gulf Stream or into warm water off the edge of the shelf. However, it was recognized that the minimal by-catch in the tuna and swordfish fisheries in these areas does not support this opinion.

Concern was expressed about the analysis of trends in length composition. Rather than dis-aggregating the data by area and season it was recommended that the analysis be conducted on the whole stock area.

There was extensive debate of the results of the standardized catch rate analysis for mature porbeagle shark which showed a marked increase from 1987 to 1992, followed by a sharp decline to a very low in 1998. It was suggested that the increase from 1987 to 1992 reflects the changeover from a foreign to a Canadian-dominated fishery and the subsequent learning curve for Canadian fishermen. It was noted that only one Faroese vessel was active in this fishery from the early 1970s until 1990 or 1991, when a second vessel participated. Industry participants contended that their overall catch rates have not declined but conceded that there has been a decrease in their catch rates of mature porbeagle shark. Although it was recognized that catch rates in 1998 and 1999 may have been affected by occurrences described by industry (above) it was generally accepted that the decrease noted since the early 1990s is indicative of a declining trend in abundance. It was recommended that water temperature should be included as a factor in the standardization model in the future.

There was a lengthy discussion of the analysis of trends in total mortality rates estimated from annual and seasonal catch curves. A concern was expressed that the analysis based on the age range from the age of maximum abundance up to age 22 likely included some ages that were not fully recruited. There was concern also that the estimate of total

mortality for the virgin 1961 fishery, which is taken as an estimate of natural mortality, is very sensitive to the age groups that are included in the analysis. It was felt that the estimate of natural mortality (0.10) for the virgin population was not very reliable but nonetheless is in agreement with those for other shark species. There was consensus that the trends in total mortality are representative.

There was also general agreement with the results of the analysis of exploitation rates based on tagging recaptures.

Considerable reservation was expressed about the applicability of the results of the yield per recruit analysis that indicated an $F_{0.1}$ target fishing mortality of 0.08. It was widely felt that this level of fishing mortality would not be sustainable, especially for the mature components of the population. It was proposed that the yield per recruit analysis be discounted and that alternative reference points be developed. Suggested alternative reference points were the replacement mortality rate (corresponding to F=0.06) or the ICES 'Rule of Thumb' reference point corresponding to 30% of the virgin population level or 30% of the spawning potential. An industry participant said that models used for groundfish were not appropriate for large pelagic species and that future assessments should be based on the same models and reference points used by ICCAT, such as general production models.

Outlook

It was acknowledged that there are numerous sources of uncertainty in this assessment but there was agreement with most of the indicators that suggest the resource is declining. There seemed to be agreement that it is essential to implement management measures to protect mature females but there was no consensus as to how this should be achieved because of concerns expressed as to how to measure the effectiveness of imposing closed areas/seasons to protect them.

Stock Status Report

- In the landings table, change the label of 'Foreign' to 'Reported Foreign' to acknowledge the uncertainties in these statistics.
- Discuss not only the geographic location of the fishery but also its timing.
- Include a description of changes to the fishery that occurred in 1998 and 1999 (i.e. quota limitation in 1998 and the voluntary suspension of fishing from June to September in 1999).
- Drop the 1999 points from both graphs of standardized catch rates, as data are incomplete.
- Add text to qualify the results of the analysis of trends in Z and reflect the uncertainty about the estimate of M.
- Qualify the results of the yield per recruit analysis and $F_{0.1}$ reference point and include either the replacement mortality reference point or the ICES 'Rule of Thumb' reference point.

- Indicate that the $F_{0.1}$ reference point may be appropriate for a fishery targeting immature sharks but not one targeting mature adults.
- Indicate that a sustainable replacement mortality rate corresponds to F=0.06.

ATLANTIC HALIBUT CONVERSION FACTORS

Working Paper:

Zwanenburg, K., and S. Wilson. 1999. Processed weight to live-weight conversion factors for Atlantic halibut (*Hippoglossus hippoglossus*) on the Scotian Shelf and southern Grand Banks. RAP WP 99/59.

Rapporteur: Wayne Stobo

The paper presented data that showed insubstantial differences between the conversion factors needed for males vs. females or for different length categories. It did however show substantial differences between the conversion factors derived from this study and those currently in use.

It was questioned if we should have conversion factors that reflected seasonal differences. While it was agreed that seasonal differences probably existed, the current study was conducted in May-June, and was not designed to examine seasonal variability.

It was agreed that the RAP should recommend that the conversion factors determined from the current study should be adopted for the Atlantic halibut fishery.

CHAIRMAN'S REMARKS

The meeting was adjourned at 1730 hr on Friday 5th November when the last SSR was approved. No time was available for a general discussion of issues arising from the meeting. Two issues of importance had been identified during the meeting for discussion, the usefulness of multiple indicators of stock and fishery status and how these can be further developed, and what the follow up should be to the work on ecosystem changes reported on by K. Zwanenburg.

The meeting was scheduled for a half-day less than that of the previous year, and it was decided to avoid evening meetings. Perhaps this was made possible by a shorter agenda. Nonetheless, it appears that first review of the SSRs immediately after WPs eliminated one opportunity for reopening of discussions and that this produced some time savings, although obviously not enough to allow time for a wrap-up discussion.

There remains scope, of course, for further improvements in time management. A second review of SSRs is necessary to ensure that requested changes have been made satisfactorily and that the document clearly expresses the committee's views. At this

stage there is a fine line between legitimate comment and the reopening of previous arguments. Reopening of issues must always be an option but one to be used sparingly, when it can be made clear that there has been an important error in fact or judgement. Unfortunately, the plan to approve Proceedings soon after the stock status discussions was not successful. It proved difficult for rapporteurs to produce drafts in such a short time frame and, in any case, the meeting time was not available for their review. However, some way of rapidly documenting agreements is worthy of further pursuit. Perhaps rapporteurs could be asked to direct their initial efforts to producing a list of agreements on SSR conclusions very quickly, with a comprehensive summary of the discussions to follow as time permits.

The progress of future such meetings could be speeded also by reducing the initial verbal presentations to an overview of the crucial issues of no more than a half-hour duration. Greater standardization of documentation among assessments would be helpful, as would resolution of purely technical issues prior to the meeting. Debates on such matters as how best to estimate size and age compositions of fishery removals, to analyze survey data, or tune SPAs could be resolved more efficiently in the preparatory phase. Working Papers should be formatted as provisional drafts of Research Documents with text to accompany tables and figures, to allow participants to quickly assimilate the pertinent information. This would allow the meeting to focus on interpretation of analyses, formulation of advice, and preparation of good quality reports. Finally, as has been said so many times before, a way needs to be found to make the documentation available some time before the meeting so that external reviewers have an opportunity to study it.

Appendix 1. List of Participants

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Appendix 2. Letter of Invitation to Prospective Industry Participants

Marine Fish Division
Maritimes Region
Science Branch
(TEL: 902 426-4890)
(FAX: 902 426-1506)
(E-mail: farrellw@dfo-mpo.gc.ca)

1 October 1999

Distribution

Subject: Maritimes Region RAP Meeting on Finfish Stocks, November 1999

Dear _____:

A meeting of the Maritimes Regional Advisory Process will be held 1-5 November 1999 to review the status of the following finfish stocks:

4X cod
4X haddock
4VWX+5Zc pollock
4VWX silver hake
Porbeagle shark

and conversion factors (dressed to round) for Atlantic halibut.

Stock status updates will be tabled for a number of other groundfish stocks also. The meeting will deal with technical issues only; catch allocations and other managerial issues will not be discussed.

As chairman, I invite you to participate in this meeting. This invitation is extended on the basis of your knowledge and experience; you are not selected to represent some specific group. As a participant you will have full status at the meeting. This could include opportunities to make presentations at appropriate periods of the agenda, to contribute to the peer review of any work tabled at the meeting, to receive all documentation, and to participate in the discussions which become the basis for stock status reports on each stock. Please note also that you will be expected to respect the confidentiality of the meeting results until the reports are made public a few weeks after the meeting.

.../2

The meeting will be held in the Regency Room, Keddy's Dartmouth Inn, 9 Braemar Drive, Dartmouth, starting in the morning of Monday 1st November and extending through the afternoon of Friday 5th November. A detailed schedule will be provided at a later date to those indicating their intention to participate.

If you plan to accept this invitation, please inform Wanda Farrell (ph: 902-426-4890: fax: 902 426-1506 or e-mail: farrellw@mar.dfo-mpo.gc.ca) at your earliest convenience.

Yours sincerely,

Ralph Halliday
Chairman

cc: W. Stobo
P. Fanning
J. Neilson
B. O'Boyle

Appendix 3. Meeting Agenda and Schedule

Regional Advisory Process
1 – 5 November 1999

AGENDA

Oceanographic Overview (Ken Drinkwater)

An overview of ocean climate conditions on the Scotian Shelf during 1999, in comparison to the historical record, will be presented.

Ecosystem Size Trends (Kees Zwanenburg)

A summary of size changes in the Scotian Shelf fish communities will be reported.

Precautionary Approach (Paul Fanning)

A methodology to report stock status using a number of quantitative and qualitative indicators will be introduced.

Stock Assessments for the following resources:

- 4X Cod (Don Clark)
- 4X Haddock (Peter Hurley)
- 4VWX5Zc Pollock (John Neilson)
- 4VWX Silver Hake (Mark Showell)

Stock status will be reported in support of the April 2000 – March 2001 fisheries.

- SA 3 – 6 porbeagle shark (Steve Campana)

Stock status will be reported in support of the 2000 + fishery.

Stock Status Reports will be produced for these assessments.

Atlantic Halibut Conversion Factors (Kees Zwanenburg)

An analysis of dressed to round conversion factors for Atlantic halibut will be presented.

A Fisheries Status Report will be produced.

Regional Advisory Process
Regency Room, Keddy's Dartmouth Inn
9 Braemar Drive, Dartmouth, Nova Scotia
1 – 5 November 1999

Time	Monday	Tuesday	Wednesday	Thursday	Friday
	1 November	2 November	3 November	4 November	5 November
09:00 – 09:30		4X Haddock	Proceedings Review	Proceedings Review	Proceedings Review
09:30 – 10:00					
10:00 – 10:30			Pollock	Silver Hake	SSRs
10:30 – 11:00		SSR Review if possible			
11:00 – 11:30			SSR Review if possible	SSR Review if possible	
11:30 – 12:00					
12:00 – 12:30	Lunch	Lunch	Lunch	Lunch	Lunch
12:30 – 13:00					
13:00 – 13:30	• Introduction	4X Cod	Porbeagle Shark	Halibut Conversion Factors	SSRs
13:30 – 14:00					
14:00 – 14:30	• Ocean Overview				
14:30 – 15:00		SSR Review if possible	SSR Review if possible	SSRs	General Discussion
15:00 – 15:30	• Ecosystem Size Trends				
15:30 – 16:00					
16:00 – 16:30	• Precautionary Approach				
16:30 – 17:00					

Appendix 4. List of Documents Tabled

Branton, R., and G.A.P. Black. 1999. 1999 summer groundfish survey update for selected Scotia-Fundy groundfish stocks. RAP WP 99/60.

Campana, S., L. Marks, W. Joyce, P. Hurley, M. Showell, and D. Kulka. 1999. An analytical assessment of the porbeagle shark (*Lamna nasus*) population in the Northwest Atlantic. RAP WP 99/57.

Chouinard, G.A., G.A. Poirier, D.P. Swain, T. Hurlbut, C. LeBlanc, and R. Morin. 1999. Preliminary results from the September 1999 groundfish survey in the Southern Gulf of St. Lawrence. RAP WP 99/61.

Clark, D.S., and S.D. Paul. 1999. Assessment of cod in Division 4X in 1999. RAP WP 99/55.

Drinkwater, K.F., R.G. Pettipas, and L.M. Petrie. 1999. Recent temperature changes on the Scotian Shelf and in the eastern Gulf of Maine. RAP WP 99/63.

Gavaris, S. 1999. An approach for considering diverse system attributes in fisheries management planning. RAP WP 99/64.

Hurley, P.C.F., G.A.P. Black, P.A. Comeau, and R.K. Mohn. 1999. Assessment of 4X haddock in 1998 and the first half of 1999. RAP WP 99/54.

Mohn, R., P. Fanning, and many others. 1999. Categories of fishery status indicators to assist in resource assessment: an illustration and discussion. RAP WP 99/62.

Neilson, J.D., P. Perley, and C. Nelson. 1999. Pollock (*Pollachius virens*) in NAFO Divisions 4VWX and Subdivision 5Zc. RAP WP 99/56 (and addendum).

Showell, M.A., and L.P. Fanning. 1999. Assessment of the Scotian Shelf silver hake population in 1998. RAP WP 99/58.

Zwanenburg, K., and G.A.P. Black. 1999. Changes in density and distribution of commercial groundfish stocks on the Scotian Shelf. RAP WP 99/65.

Zwanenburg, K., and S. Wilson. 1999. Processed weight to live-weight conversion factors for Atlantic halibut (*Hippoglossus hippoglossus*) on the Scotian Shelf and southern Grand Banks. RAP WP 99/59.

Appendix 5. List of Recommendations

Cod in 4X5Y

- Investigate the use of quarterly age-length keys within gear and area, applying keys from adjacent years when data are missing, as there are no trends in weight at age or condition over years.
- Analyze US survey data to improve estimates of length and age composition and trajectory of the 4X cod population.
- For the next assessment, alternative approaches to incorporation of the ITQ surveys should be explored that make the fullest use of the data available.

Pollock in 4VWX5

- Use of RV and ITQ surveys for calibration of the SPA should be re-examined for the next assessment.
- Tagging data should be re-examined to see whether there is support in the data for separate assessments for pollock in 4X5 and 4VW.

Silver Hake in 4VWX

- Investigate development of an index of abundance from data on catch rates of the Canadian fleet by standardizing for factors such as the effect of experience, vessel horsepower and gear used, based on a cooperative effort between industry and DFO Science.

Porbeagle Shark

- Include water temperature as a factor in the model for standardization of commercial catch rates in future.